Statement of Verification

BREG EN EPD No.: 000486 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Profine GmbH

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

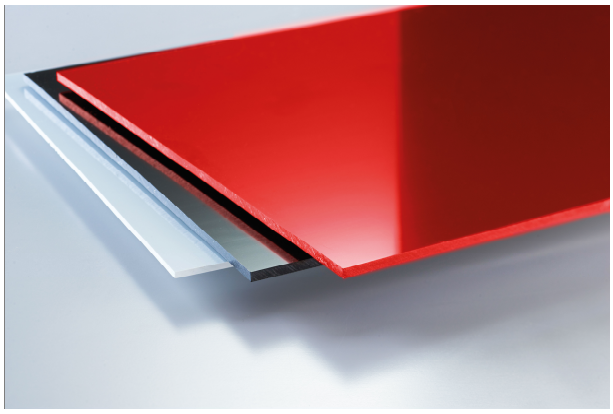
BRE Global Scheme Document SD207

This declaration is for:

1 m² of KömaDur Internal wall cladding

Company Address

Profine GmbH
Pirmasens
Zweibrückerstraße 200,
66954 Pirmasens,
Germany



Kömmerling® TODAY FOR TOMORROW

Signature here

Signed for BRE Global Ltd	Operator	25 April 2023 Date of this Issue
25 April 2023 Date of First Issue		24 April 2028 Expiry Date

BRE Global Verified EPD

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ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

EPD Number: **000486**

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Profine GmbH Pirmasens Zweibrückerstraße 200, 66954 Pirmasens, Germany	Bala Subramanian, BRE LINA 2.0
Declared Unit	**Applicability/Coverage**
1 m² of KömaDur Internal wall cladding	Product Average.
EPD Type	**Background database**
Cradle to Gate with options	ecoinvent

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☐ External
(Where appropriate [b])Third party verifier: Click here to enter text.
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Profine GmbH

Pirmasens
Zweibrückerstraße 200,
66954 Pirmasens,
Germany

Construction Product

Product Description

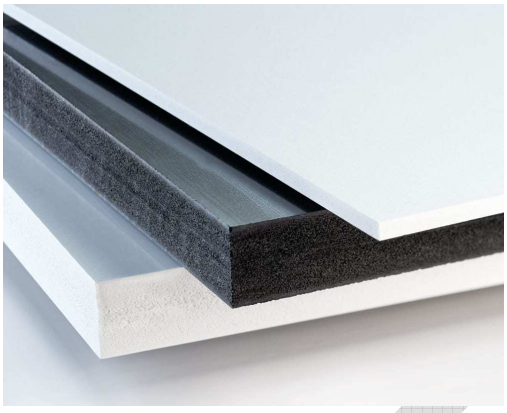
KömaDur is a high solid sheet made of rigid PVC. The outcome is rigid PVC-U sheets that are characterised by a homogeneous, smooth, and glossy surface quality. They are resistant to flames, chemicals, and corrosion in compliance with DIN 8061 and to most aggressive media. Its convincing properties and diversity make the KömaDur programme the ideal material for many applications. It has special forming, printing, or outdoor properties, depending on the requirement.

KömaDur is available in various thicknesses ranging from 0.9 mm to 30 mm; this EPD represents 1 m² of internal wall cladding with a weight of 1 kg/m² of KömaDur panel. This is to enable the impacts on the range of KömaDur panels to be calculated for the available thicknesses.

Technical Information

Technical properties are of all products assessed within this average EPD

Mechanical properties		Standard	Unit	Value KömaDur:				
				M	D	ES	H	WA
Apparent density*		DIN EN ISO 1183	g / cm3	~ 1.43	~ 1.43	~ 1.43	~ 1.43	~ 1.43
Yield stress (tensile strength)		DIN EN ISO 527	MPa	≥ 55	≥ 50	≥ 48	≥ 45	≥ 55
Elongation at tear		DIN EN ISO 527	%	≥ 15	≥ 15	≥ 20	≥ 20	≥ 15
Flexural strength		DIN EN ISO 178	MPa	≥ 80	≥ 75	≥ 75	≥ 70	≥ 80
Compressive strength		DIN EN ISO 844	MPa	≥ 70	≥ 65	≥ 65	≥ 60	≥ 70
Modulus of elasticity		DIN EN ISO 527-2 / 1A / 50	MPa	≥ 3000	≥ 2500	≥ 2500	≥ 2500	≥ 3000
Notched impact strength		DIN EN ISO 179-1ePA	KJ / m2	≥ 4	≥ 6	≥ 6	≥ 8	≥ 4
Impact strength		DIN EN ISO 179	KJ / m2					
	0 °C			no failure	no failure	no failure	no failure	no failure
	-20 °C			-	no failure	no failure	no failure	-
	-30 °C			-	-	no failure	no failure	-
	-40 °C			-	-	-	no failure	-
Ball indentation hardness (358 N / 30 s)		DIN EN ISO 2039	MPa	~ 100	~ 90	~ 90	~ 90	~ 100
Thermal properties								
Vicat softening temperature		DIN EN ISO 306 (process B50)	°C	≥ 75	≥ 72	≥ 72	≥ 72	≥ 75
Deflection temperature		DIN EN ISO 75	°C	~ 68	~ 66	~ 66	~ 66	~ 68
Coefficient of linear thermal expansion from – 30 °C to + 50 °C		DIN EN ISO 11359-2 (process Ae)	mm / mK	0.08	0.08	0.08	0.08	0.08
Thermal conductivity from 0 °C to + 60 °C		DIN EN ISO 22007	W / mK	0.16	0.16	0.16	0.16	0.16



Main Product Contents

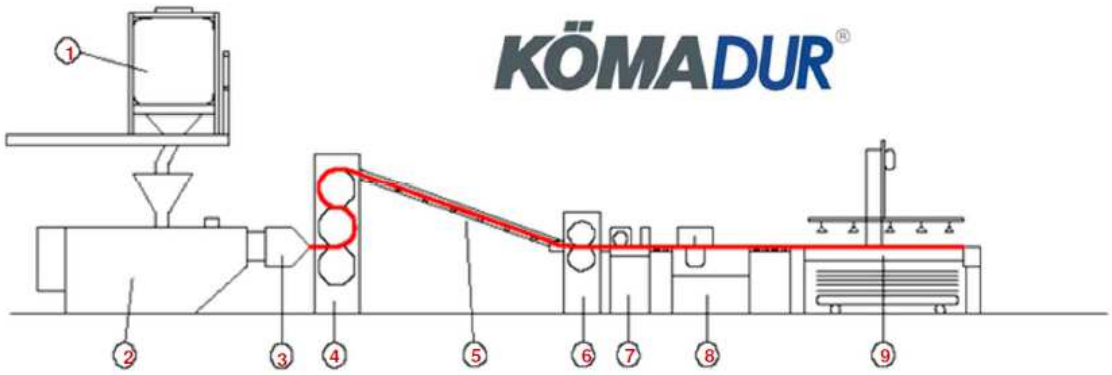
Material composition of all products assessed within this average EPD

Material/Chemical Input	%
Polyvinylchloride	80 - 85
Co-Stabilizer	0.5 - 1
Calcium Carbonate	0 - 7
Pigment	0 - 0.5
Lubricant	1 - 2
Sn Stabiliser	0.5 - 1.5
Modifier	1.5 - 10
Processing aid	1.5 - 2.5
Others	0 - 5

Manufacturing Process

A solid PVC sheet is created by a slot die and a calender. With different surfaces of the calender rolls, different surface qualities can be produced. Like glossy, matt or with a structure. For different applications the required product quality can be achieved

Process flow diagram



1) Charge
2) Twin-screw extruder
3) Flat sheet die
4) 3 smoothing rolls
5) Roller train
6) Draw-off roll
7) Saw-cutting / skip slitter
8) Saw-cutting / guillotine shears
9) Stack / pallet type conveyor

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 m² of KömaDur Interior wall cladding panel

System boundary

This is a cradle-to-gate with options LCA study that follows the modular design defined in EN 15804:2012+A1:2013 and includes the production stage modules, A1 to A3; and construction stages A4 Transport and A5 Installation.

Data sources, quality and allocation

Datasets are derived from Ecoinvent v3.2 (2015) and the LCA tool used was BRE LINA v2.0. The LCA models and reports the modules such as A1 to A3 - production stage, A4 - transportation and A5 - installation. No inputs or outputs have been excluded, all the ancillary materials, energy, and water use are included. Only exemptions are emissions to air, water, and soil are not measured during the data collection period. The quantity used in the data collection for this EPD is for the total quantity of KömaDur manufacturing as a proportion of the total manufactured during the data collection period (01-01-2021 to 31-12-2021), which was calculated at 7.7%.

Profine GmbH manufactures KömaDur in thicknesses from 0.9 mm to 30 mm with densities from 1.527 to 1.397 kg/m³, however, the composition of each thickness is same; so, to provide the average EPD, the

impacts are analysed by using total production data of the KömaDur for 1 kg/m² to enable the impacts for the different thicknesses. And the impacts are calculated for the range of thicknesses 0.9mm, 2.5mm, 10mm and 30mm.

Profine GmbH manufactures other products in addition to KömaDur products; therefore, an allocation of fuel consumption, water consumption, and discharge is required, and this has been done according to the provisions of the BRE PCR PN514 and EN 15804. Waste and Electricity consumption was determined by measuring the consumption on the manufacturing site for all production lines and weighted proportionally by production of KömaDur. The original data collection form has been used while doing an LCA analysis, there was a no uplift in the given data.

Secondary data has been obtained for all other upstream and downstream processes that are beyond the control of the manufacturer (i.e., raw material production) from the ecoinvent 3.2 database. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN15804.

Specific European and electricity Germany – electricity datasets have been selected from the ecoinvent LCI for this LCA. The quality levels of geographical and technical representativeness are therefore very good. The quality level of time representativeness is fair as the background LCI datasets are based on ecoinvent v3.2 which was compiled in 2015. Therefore, there is approximately 5-6 years between the ecoinvent LCI reference year and the time period for which the LCA was undertaken.

Cut-off criteria

All the raw materials, ancillary materials, process energy, general energy, water use/discharge and production waste have been included. Only emission to water, land, and soil was not covered.

LCA Results

The results per declared unit (1 kg/m²) of the KömaDur Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	2.71E+00	1.02E-07	1.19E-02	2.63E-03	3.30E-03	1.76E-05	6.09E+01
	Transport	A2	1.63E-01	2.96E-08	8.59E-04	1.69E-04	1.11E-04	3.88E-07	2.45E+00
	Manufacturing	A3	2.83E-01	2.62E-08	7.94E-04	1.25E-03	1.47E-04	9.36E-07	6.55E+00
	Total (of product stage)	A1-3	3.16E+00	1.58E-07	1.35E-02	4.05E-03	3.56E-03	1.90E-05	6.99E+01
Construction process stage	Transport	A4	1.00E-01	1.85E-08	3.35E-04	8.85E-05	5.85E-05	2.64E-07	1.52E+00
	Construction	A5	2.82E+01	1.69E-06	1.33E-01	8.30E-02	2.96E-02	3.62E-04	3.83E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	3.04E+00	4.35E-03	3.04E+00	7.05E+01	0.00E+00	7.05E+01
	Transport	A2	3.54E-02	1.15E-07	3.54E-02	2.44E+00	0.00E+00	2.44E+00
	Manufacturing	A3	1.65E+00	9.49E-06	1.65E+00	7.13E+00	4.20E-02	7.17E+00
	Total (of product stage)	A1-3	4.73E+00	4.36E-03	4.73E+00	8.01E+01	4.20E-02	8.01E+01
Construction process stage	Transport	A4	2.01E-02	7.49E-08	2.01E-02	1.51E+00	0.00E+00	1.51E+00
	Construction	A5	3.06E+01	6.07E-03	3.06E+01	3.93E+02	1.87E+01	4.12E+02

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water

			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	1.94E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	5.37E-04
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	4.15E-03
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	1.99E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	3.28E-04
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	8.41E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

Other environmental information describing waste categories

			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	8.54E-02	2.77E-01	6.20E-05
	Transport	A2	1.03E-03	1.03E-01	1.69E-05
	Manufacturing	A3	2.19E-03	2.31E-02	2.11E-05
	Total (of product stage)	A1-3	8.87E-02	4.02E-01	1.00E-04
Construction process stage	Transport	A4	6.35E-04	7.06E-02	1.04E-05
	Construction	A5	7.33E+00	2.54E+00	8.94E-04

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	1.30E-01	1.17E-03	2.38E-04	0.00E+00
	Total (of product stage)	A1-3	1.30E-01	1.17E-03	2.38E-04	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	6.52E-03	5.87E-05	1.19E-05	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

LCA Results – 0.9 mm Thickness panel

The results per declared unit (1.374 kg/m²) of the KömaDur Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	3.73E+00	1.41E-07	1.63E-02	3.61E-03	4.54E-03	2.34E-05	8.37E+01
	Transport	A2	2.24E-01	4.07E-08	1.18E-03	2.33E-04	1.52E-04	5.34E-07	3.36E+00
	Manufacturing	A3	3.89E-01	3.60E-08	1.09E-03	1.72E-03	2.02E-04	1.29E-06	9.00E+00
	Total (of product stage)	A1-3	4.34E+00	2.17E-07	1.86E-02	5.56E-03	4.89E-03	2.52E-05	9.60E+01
Construction process stage	Transport	A4	1.38E-01	2.54E-08	4.61E-04	1.22E-04	8.04E-05	3.63E-07	2.08E+00
	Construction	A5	2.82E+01	1.70E-06	1.34E-01	8.31E-02	2.97E-02	3.63E-04	3.84E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	4.18E+00	5.98E-03	4.18E+00	9.69E+01	0.00E+00	9.69E+01
	Transport	A2	4.87E-02	1.58E-07	4.87E-02	3.35E+00	0.00E+00	3.35E+00
	Manufacturing	A3	2.27E+00	1.30E-05	2.27E+00	9.80E+00	5.76E-02	9.86E+00
	Total (of product stage)	A1-3	6.50E+00	5.99E-03	6.50E+00	1.10E+02	5.76E-02	1.10E+02
Construction process stage	Transport	A4	2.76E-02	1.03E-07	2.76E-02	2.07E+00	0.00E+00	2.07E+00
	Construction	A5	3.07E+01	6.15E-03	3.07E+01	3.95E+02	1.87E+01	4.13E+02

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water

			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	2.67E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	7.39E-04
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	5.70E-03
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	2.74E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	4.51E-04
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	8.45E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

Other environmental information describing waste categories

			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.17E-01	3.80E-01	8.52E-05
	Transport	A2	1.41E-03	1.41E-01	2.32E-05
	Manufacturing	A3	3.01E-03	3.17E-02	2.90E-05
	Total (of product stage)	A1-3	1.22E-01	5.53E-01	1.37E-04
Construction process stage	Transport	A4	8.72E-04	9.71E-02	1.44E-05
	Construction	A5	7.33E+00	2.54E+00	8.96E-04

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	1.79E-01	1.70E-03	3.26E-04	0.00E+00
	Total (of product stage)	A1-3	1.79E-01	1.70E-03	3.26E-04	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	9.62E-03	1.33E-01	1.63E-05	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

LCA Results – 2.5 mm Thickness panel

The results per declared unit (3.575 kg/m²) of the KömaDur Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	9.70E+00	3.66E-07	4.25E-02	9.41E-03	1.18E-02	6.42E-05	2.18E+02
	Transport	A2	5.83E-01	1.06E-07	3.07E-03	6.05E-04	3.96E-04	1.39E-06	8.75E+00
	Manufacturing	A3	9.82E-01	9.44E-08	2.83E-03	4.47E-03	5.16E-04	3.35E-06	2.35E+01
	Total (of product stage)	A1-3	1.13E+01	5.66E-07	4.84E-02	1.45E-02	1.27E-02	6.89E-05	2.50E+02
Construction process stage	Transport	A4	3.59E-01	6.60E-08	1.20E-03	3.16E-04	2.09E-04	9.45E-07	5.42E+00
	Construction	A5	2.86E+01	1.72E-06	1.35E-01	8.36E-02	3.00E-02	3.65E-04	3.92E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.09E+01	1.56E-02	1.09E+01	2.52E+02	0.00E+00	2.52E+02
	Transport	A2	1.27E-01	4.11E-07	1.27E-01	8.72E+00	0.00E+00	8.72E+00
	Manufacturing	A3	5.91E+00	3.39E-05	5.91E+00	2.56E+01	1.50E-01	2.57E+01
	Total (of product stage)	A1-3	1.69E+01	1.56E-02	1.69E+01	2.86E+02	1.50E-01	2.87E+02
Construction process stage	Transport	A4	7.19E-02	2.68E-07	7.19E-02	5.38E+00	0.00E+00	5.38E+00
	Construction	A5	3.12E+01	6.63E-03	3.13E+01	4.04E+02	1.87E+01	4.22E+02

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PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water

			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	6.95E-01
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	1.92E-03
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	1.48E-02
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	7.12E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	1.17E-03
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	8.67E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

Other environmental information describing waste categories

			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	3.05E-01	9.89E-01	2.22E-04
	Transport	A2	3.67E-03	3.67E-01	6.03E-05
	Manufacturing	A3	8.70E-03	8.24E-02	7.59E-05
	Total (of product stage)	A1-3	3.18E-01	1.44E+00	3.58E-04
Construction process stage	Transport	A4	2.27E-03	2.53E-01	3.74E-05
	Construction	A5	7.34E+00	2.60E+00	9.08E-04

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	4.71E-01	1.86E-05	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	4.71E-01	1.86E-05	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	6.85E-02	1.99E-01	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

LCA Results – 10 mm Thickness panel

The results per declared unit (14.070 kg/m²) of the KömaDur Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	3.82E+01	1.44E-06	1.67E-01	3.70E-02	4.65E-02	2.53E-04	8.57E+02
	Transport	A2	2.29E+00	4.17E-07	1.21E-02	2.38E-03	1.56E-03	5.47E-06	3.44E+01
	Manufacturing	A3	3.86E+00	3.72E-07	1.11E-02	1.76E-02	2.03E-03	1.32E-05	9.24E+01
	Total (of product stage)	A1-3	4.43E+01	2.23E-06	1.91E-01	5.70E-02	5.01E-02	2.72E-04	9.84E+02
Construction process stage	Transport	A4	1.41E+00	2.60E-07	4.72E-03	1.25E-03	8.23E-04	3.72E-06	2.13E+01
	Construction	A5	3.09E+01	1.92E-06	1.44E-01	8.63E-02	3.23E-02	3.77E-04	4.39E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	4.28E+01	6.12E-02	4.28E+01	9.92E+02	0.00E+00	9.92E+02
	Transport	A2	4.99E-01	1.62E-06	4.99E-01	3.43E+01	0.00E+00	3.43E+01
	Manufacturing	A3	2.33E+01	1.33E-04	2.33E+01	1.01E+02	5.90E-01	1.01E+02
	Total (of product stage)	A1-3	6.65E+01	6.14E-02	6.66E+01	1.13E+03	5.90E-01	1.13E+03
Construction process stage	Transport	A4	2.83E-01	1.05E-06	2.83E-01	2.12E+01	0.00E+00	2.12E+01
	Construction	A5	3.39E+01	8.92E-03	3.39E+01	4.56E+02	1.87E+01	4.75E+02

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water

			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	2.73E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	7.56E-03
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	5.83E-02
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	2.80E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	4.62E-03
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	9.74E-01

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

Other environmental information describing waste categories

			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	1.20E+00	3.89E+00	8.73E-04
	Transport	A2	1.44E-02	1.44E+00	2.37E-04
	Manufacturing	A3	3.42E-02	3.24E-01	2.99E-04
	Total (of product stage)	A1-3	1.25E+00	5.66E+00	1.41E-03
Construction process stage	Transport	A4	8.93E-03	9.94E-01	1.47E-04
	Construction	A5	7.39E+00	3.29E+00	1.03E-03

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	1.85E+00	7.34E-05	0.00E+00	0.00E+00
	Total (of product stage)	A1-3	1.85E+00	7.34E-05	0.00E+00	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	1.38E-01	7.23E-01	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

LCA Results – 30mm Thickness panel

The results per declared unit (41.910 kg/m²) of the KömaDur Interior wall cladding panel.

Parameters describing environmental impacts

			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	1.14E+02	4.29E-06	4.98E-01	1.10E-01	1.38E-01	7.38E-04	2.55E+03
	Transport	A2	6.83E+00	1.24E-06	3.60E-02	7.09E-03	4.64E-03	1.63E-05	1.03E+02
	Manufacturing	A3	1.19E+01	1.10E-06	3.33E-02	5.24E-02	6.15E-03	3.92E-05	2.75E+02
	Total (of product stage)	A1-3	1.32E+02	6.63E-06	5.68E-01	1.70E-01	1.49E-01	7.93E-04	2.93E+03
Construction process stage	Transport	A4	4.20E+00	7.74E-07	1.41E-02	3.71E-03	2.45E-03	1.11E-05	6.35E+01
	Construction	A5	3.48E+01	2.05E-06	1.62E-01	9.15E-02	3.70E-02	4.02E-04	5.29E+02

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

Parameters describing resource use, primary energy

			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	1.27E+02	1.82E-01	1.28E+02	2.96E+03	0.00E+00	2.96E+03
	Transport	A2	1.48E+00	4.82E-06	1.48E+00	1.02E+02	0.00E+00	1.02E+02
	Manufacturing	A3	6.93E+01	3.98E-04	6.93E+01	2.99E+02	1.76E+00	3.01E+02
	Total (of product stage)	A1-3	1.98E+02	1.83E-01	1.98E+02	3.36E+03	1.76E+00	3.36E+03
Construction process stage	Transport	A4	8.43E-01	3.14E-06	8.43E-01	6.31E+01	0.00E+00	6.31E+01
	Construction	A5	4.04E+01	1.50E-02	4.04E+01	5.60E+02	1.87E+01	5.79E+02

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	8.14E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	2.25E-02
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	1.73E-01
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	8.34E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	1.38E-02
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	1.25E+00

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	3.58E+00	1.16E+01	2.60E-03
	Transport	A2	4.30E-02	4.30E+00	7.06E-04
	Manufacturing	A3	9.18E-02	9.67E-01	8.83E-04
	Total (of product stage)	A1-3	3.72E+00	1.69E+01	4.19E-03
Construction process stage	Transport	A4	2.66E-02	2.96E+00	4.38E-04
	Construction	A5	7.51E+00	3.50E+00	1.12E-03

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	5.47E+00	5.02E-02	1.11E-02	0.00E+00
	Total (of product stage)	A1-3	5.47E+00	5.02E-02	1.11E-02	0.00E+00
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	3.18E-01	2.12E+00	5.56E-04	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Transported from Germany to mainly plastic distributors and industrial customers, also building industries across Europe		
	Fuel type / Vehicle type	Litre of fuel type per distance or vehicle type	Lorry, 16 - 32 metric ton
	Distance	km	600
	Capacity utilisation (incl. empty returns)	%	26
	Bulk density of transported products	kg/m^3	217
A5 – Installation in the building	The panels will be adjusted to the final dimensions, then they are installed using screw or adhesive connections		
	Installation waste percentage	5	%

Interpretation of results

The bulk of the environmental impacts and primary energy demand are attributed to the upstream manufacturing process of the Interior wall cladding panel, covered by information modules A1-A3 of EN15804:2012+A1:2013.

Individual product calculations

The LCA results listed in the tables above are for KömaDur panels, which are for the processing of 1 kg/m^2. The end-user of this EPD can therefore use these results to calculate impact profiles for each KömaDur panels with different thicknesses by using the weight per m^2. In the below calculation table, the GWP impacts have been calculated for the standard product thicknesses for 1 kg/m2 as an example to enable calculations for other thicknesses.

KömaDur Thickness		**1**	**3**	**4**	**6**
Kg/m2	**1**	**1.45**	**4.22**	**5.59**	**8.48**
A1	2.71E+00	3.92E+00	1.14E+01	1.51E+01	2.30E+01
A2	1.63E-01	2.36E-01	6.88E-01	9.11E-01	1.38E+00
A3	2.83E-01	4.10E-01	1.19E+00	1.58E+00	2.40E+00
A1-A3	3.16E+00	4.57E+00	1.33E+01	1.76E+01	2.68E+01

References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A1:2013. London, BSI, 2013.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

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